PERIPHERAL NERVE INJURY IN FRACTURES 
AND DISLOCATIONS OF LONG BONES* 

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(Received for publication December 12, 1944) 

Injuries of peripheral nerves in association with fractures and dislocations of long bones are frequent and the consulted literature includes many cases. The contributions of Bristow, Speed, Lewis, Lewis and Miller, Platt, Stuck, Watson-Jones, and others consider the subject adequately. The present paper is a report on 51 patients operated upon for nerve injuries associated with fracture and dislocation of long bones. There were 53 such injuries in this series, more than one nerve having been involved in two cases. A portion of this work was reported in 1934. This is not a statistical survey, since a majority of the patients were referred to the neurosurgeon as a last resort. However, a certain number among them were treated from the beginning with the orthopedic surgeon in charge. In the following few pages we propose to discuss this series and the lessons learned in their management. 

Nerve injury associated with fracture and dislocation may be primary or secondary, as has been emphasized by almost all authors. The diagnosis of primary nerve injury is seldom made, and the physician treating the patient usually discovers the nerve complication several weeks after the injury, following the removal of a splint or a cast. In management the presence of a primary nerve injury is important. Secondary nerve injuries are attributed to scar and callous inclusion with eventual dysfunction of the nerve from pressure. A third type of nerve involvement, that is, a late neuritis or tardy neuritis, should also be defined for the sake of completeness. Tardy nerve involvement (usually ulnar) is associated with a latent period of many months or years, with eventual implication and dysfunction of the nerve. 

MATERIAL 

The 53 nerve injuries for which operations were performed included 32 radial, 9 ulnar, 3 median, 8 peroneal and 1 sciatic. The work was done mainly at the Receiving and Grace Hospitals in Detroit. 

Radial Nerve Involvement. In Table I the radial nerve cases are analyzed. It is to be noted that there was radial dysfunction in association with fracture of the upper third, fracture of the middle third, fracture of the lower third, supracondylar fracture of the humerus and anterior dislocation of the head of the radius. The involvement was secondary in 19 and primary in 11 cases. The exploration was done under five weeks in 7 cases, from six to ten 

* Presented before the Western Surgical Association, Chicago, Illinois, December 2, 1944. 

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weeks in 11, eleven weeks and over in the remaining 14. In 5 the radial nerve was found sectioned. In 3 of this group there was no operative procedure prior to the radial nerve exploration. In the other 2 an open reduction had been performed elsewhere and one could not ascertain whether or not the nerve involvement was primary or secondary (Fig. 6).

The results of exploration were gratifying in 26, unknown in 4 and poor in 2 cases. Of the two “failures,” in one there was practically no radial nerve between the fracture site and the antecubital fossa, and in the other there was a gap of four inches of nerve loss. In the case of radial paralysis associated with fracture of the upper third of the humerus, the proximal and the distal ends of the nerve were dissected free through two incisions (Fig. 5); a lateral incision for the distal, and an incision on the medial aspect of the arm for the proximal ends. In this case the radial nerve had been incorporated in the healed fracture and the nerve was sectioned off the bone and sutured posterior to the humerus. Complete recovery ensued in fourteen months.

The usual incision for the exposure of the nerve in the supracondylar and middle third fractures of the humerus extended from the antecubital fossa laterally and posteriorly to the middle third of the arm. The nerve was dissected out in its normal position below and above the lesion, with further dissection at the site of pathological change. After freeing the nerve it was transposed into a live muscle bed. If the nerve had undergone neuromatous degeneration neurolysis was performed, and if the individual bundles, although swollen at the site of trauma, were still patent the nerve continuity was not disturbed (Fig. 4). If the nerve was found sectioned, it was sutured in the usual manner (Figs. 2 and 3).

We have had 4 instances of radial palsy associated with anterior dislocation of the head of the radius, with fracture of the ulna in 2 cases. These were treated by excision of the head of the radius, dissection of the nerve away from scar and its transposition into a muscle bed. An incision bisecting the antecubital fossa and extending toward the lateral aspect of the arm (Fig. 8) along the junction of the brachialis and brachio-radialis muscles was used. Recently the surgical exposure of the proximal end of the ulna and radius through one incision in Monteggia’s fracture has been advocated by Boyd. If such a fracture is complicated by radial paralysis, the open reduction and the inspection of the nerve may be carried out advantageously through two incisions: The posterior incision advocated by Boyd for the immobilization of the ulna, and an anterior incision bisecting the antecubital fossa to expose the radial nerve and the dislocated head of the radius. Reconstructive work on the head of the radius through the anterior incision would be somewhat simpler (Figs. 7 and 8).

The prognosis in radial paralysis is excellent. It is conceivable that in a certain number of our series, nerve function might have returned without operation, but early exploration in competent hands is justifiable and there is reason to believe that it decreases the total period of disability. In most